# DISSERTATION

# A STUDY ON ORAL CAVITY CANCERS

ASSOCIATION OF RISK FACTORS, PRIMARY RADIOTHERAPY,
PRIMARY SURGERY & SALVAGE SURGERY.

*Submitted For*

## M.S. DEGREE EXAMINATION

## BRANCH – I PART – II M.S

**(GENERAL SURGERY)**


**THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY**
KILPAUK MEDICAL COLLEGE,
CHENNAI – 600 010

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# CERTIFICATE

This is to certify that this dissertation titled A Study on Oral Cavity Cancers is the original and bonafide work done by **Dr. JOHN MATHEW MANIPADAM** under my guidance and supervision at the Govt. Kilpauk Medical College, Chennai – 600010, during the tenure of his course in M.S. (General Surgery) from March 2004 to March 2007 held under the regulation of the Tamil Nadu Dr. M.G.R. Medical University, Guindy, Chennai – 600 032.

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Last but not the least, my gratitude to the patients involved who were kind and co-operative.

## CONTENTS

# CHAPTER – 1

## INTRODUCTION

Oral Carcinomas are grouped under

Buccal Mucosa

1. Cheek
2. Buccoalveolar sulci
3. Retromolar
4. Lip – Upper, Lower, Angle of mouth (fissure)

Carcinoma Tongue anterior 2/3

Carcinoma alveolus upper, lower

Carcinoma floor of mouth

Carcinoma palate.

Among the Carcinoma of oral cavity the commonest was Squomous cell Carcinoma. The majority if these are seen in very advanced stage and treatment of these conditions are very demanding with surgery and radiotherapy being the main modality of therapy.

The pathetic way they come to hospital is a challenge to the surgeon, surgical team and hospital when attempts are made to solve this problem.

The incidence among oral cancers, association of risk factors, role of primary radiotherapy, palliative radiotherapy, primary surgery and salvage surgery for advanced disease has been studied.

## CHAPTER – 2

## AIM OF THE STUDY

- To find out the age group with highest incidence
- To find out the site of commonest presentation
- Association of risk factors with oral cancers
- To find presenting stage at the time of hospital visit
- To assess the response of primary radiotherapy in all stages of disease
- To study role of primary surgery
- To study the role of salvage surgery and out come in advanced oral Carcinoma
- To look in to various aspects of primary reconstruction for excisional defect in oral cancer.

# CHAPTER – 3

## MATERIALS AND METHODS

All patients who reported at cancer department diagnosed as oral cancer at Govt. Royapettah Hospital were included in the study.

The study period was eighteen months from Oct 2004 to Mar 2006. No specific selection criteria was used among oral cancers.

The patients either came to department of cancer directly or were referred from other departments and other hospitals after proving the malignancy by histopathological examination.

Diagnosis was confirmed by histopathological examination of specimen obtained by wedge biopsy of ulcer/growth.

Detailed history regarding duration of symptoms habits like smoking / tobacco were obtained, baseline investigation done which included a complete hemogram, blood biochemistry, X-raychest and X-ray mandible as required.

A through physical examination was done to assess the size and extent of tumour, presence or absence of trismus, involvement of bone & skin. Nodal status assessed clinically. All patients assessed and stage in TNM staging.

The protocol followed at the cancer department GRH is to subject the patients with advanced disease to primary radiotherapy except in few occasion where surgery has been taken as primary modality of management.

Radiotherapy was given as external beam radio therapy using radioactive cobalt 60.

Dosage used was 6000 CGy

200 CGy / day for 5 days in a week for 5 – 7 weeks

**Criteria for response**

Complete regression of tumour and nodes was taken as excellent response while presence of residual lesion post radiotherapy was considered partial response.

**Follow – up**

Complete regression of lesion were followed up with observation.

Residual lesion were subject to SALVAGE SURGERY which included resection of tumour along with RND.

RND – Routinely performed in all cases which requires a block dissection. Modified criles incision was used. Flaps raised and dissection carried out. Sacrificing SCM, IJV and Spinal accessory N.

All patients underwent primary reconstructions for the excisional defects.

The primary reconstruction carried out among the cases are

Primary suture

Split skin graft

Pectoralis major myocutaneous flap

Pectoralis major osseomyocutoneus flap

Fore head flap

Among these pectoral's major myocutaneous flap was used in majority of cases for both inner lining and cover.

All patients followed up two weeks later after surgery and once to twice in a month.

LIMITATIONS

i. There was a very high dropout rate even at the initial stage of study. some patients were not willing for salvage procedure after RT.

ii. Because of short period available, patients could be followed for a minimum period, only, Hence adequate data regarding tumour free interval, survival period, exact recurrence rate were not available.

iii. Since most of the patient present with late stage of disease, proper evaluation of primary RT and salvage procedure in early, stage of disease could not be studied.

# CHAPTER – 4

# ANATOMY

The oral cavity includes buccal mucosal lining of inner aspect of cheeks, lips from contact of opposing lips to the line of attachment of upper and lower alveolar ridges, mucosal lines of alveolar process of maxilla and mandible, palate, sulci of both jaws, floor of mouth, tongue.

The mucous membrance of mouth is adherent to the deeper structures, on lips and check to face nuscles, on tongue to the muscles thereof and on the hard plate to the periosteum of the bone. Mucous membranes of periosteum is strongly united with periosteum and the combined layers are called mucoperiosteum. The attachment of periosteum to bone is secured by sharpey's fibres. Over the horizontal plate of palatine bone mucus membrane and periosteum are separated by a mass of mucous gland tissue. It is covered with stratified Squomous epithelium and is supplied by trigeminal nerve, above by maxillary nerve and below by mandibular nerve.

Tongue is essentially a mass of skeletal muscle mostly covered by mucous membrane. Main parts are dorsum, tip, inferior surface and root. Anterior 2/3 of tongue (pre sulcal) is covered by mucous membrane into which underlying muscles are inserted. Surface epithelium is of stratified squamous epithelium and is roughened by presence of many papillae. No glands on dorsum of 2/3 of tongue. Posterior third is really a part of pharynx but it is obviously (Post sulcal)

convenient to study with it's rest of organ as part of mouth. Between tongue and epiglottis is glossoepiglottic fold.

Separating the elastic membrane of oral floor and oral cavity area is the mandible. The body of the mandible is covered by loose free gingival mucosa. The alveolar ridge is that section holding the teeth and is covered by the attached gingival mucosa. The bond between the periosteum of alveolar ridges and specialized attached gingival mucosa is necessary for wearing dentures. Preservation of buccal sulcus, oral floor, preservation of chewing, provision of a base for dental appliances and preservation of normal appearing lower third of face are all essential reasons for maintenance (or) restoration of mandibular contour.

An understanding of the regional lymph node anatomy is critical to the case of head and neck cancer patients, there are several major lymphatic chains in the neck containing nearly 200 lymph nodes that run parallel to the jugular veins, spinal accessory Nerve and into the submandibular triangle.

To facilitate communication regarding cervical node anatomy various levels been described.

Level I - Includes nodes within the submental and submandibular triangle

Level II - Includes nodes extending from subdigastric area to the carotid and nodes surrounding spinal accessory N

from jugular foramen to the posterior border of sternocleidomastoid muscle.

Level III - Includes nodes principally along the jugular veins between the carotid and its bifurcation, posterior border of sterno cleido mastoid muscle and omohyoid.

Level IV - Includes nodes below omohyoid above the level of clavicle between carotid vessels anteriorly and omohyoid posteriorly.

Level V - Includes nodes in the posterior cervical triangle.

# CHAPTER – 5

# ETIOLOGY

## TOBACCO

The relation between tobacco exposure to oral mucosa and disease development has been demonstrated strongly. A clear dose – response relationship has been identified, with a greater risk being directly proportional to intensity and duration of exposure. It is one among the independent strong risk factors. Risks decreased only gradually after cessation of tobacco, tobacco use was also linked with salivar gland tumours.

## SMOKING

The risk of malignancy is six times of non-smokers. Approximately 90% of patients with cancer oral cavity smoke tobacco. Smoking filter Vs non filter cigarettes does not alter risk, while cessation of tobacco smoke use appears to reduce risk only gradually.

## SMOKELESS TOBACCO

The risk of oral cancer was found to increase four times in use of smokeless tobacco. In India and other parts of world, the habit exists of using dried and cured tobacco leaf, betel nut or quid and slaked lime. This mixture is highly irritant to oral mucosa.

## ALCOHOL

Alcohol is another strong independent risk factor for oral cancer with a multiplicative effect from combined exposure with tobacco. Although pure ethanol has never been shown to be carcinogenic in laboratory experiments, alcoholic beverages are now recognized as been important actiological factors in the development of oral cancer. The exact mechanism by which alcohol may exert influence upon oral mucosa has received less attention. Indirectly vitamin deficiencies and poor detoxfying capability due to alcohol – induced liver dysfunction may promote carcinogenesis.

## DIET & NUTRITION

The plummer Vinson syndrome has been associated with increased risk of oral malignancy. Recent studies suggest Vit A,C and carotenoids may be protective against epithelial cancers.

## GENETIC

The over expression of $P^{53}$ gene in cancer of oral cavity has been correlated with smoking and drinking. The $P^{53}$ gene may be used in the future as a potential tumour marker and may help in identifying patients who are at risk for cancer development.

The c-myc and erb B-1 oncogene have been associated with squomous cell Carcinoma of oral cavity. The P53 gene may be involved in the initial stages of carcinogenesis and c-mye, erb B – and ECF – R gene may become activated in later stages.

## VIRAL

Another possible etiologic agent for carcinogenesis is human papilloma virus (HPV); an epitheliotrophic DNA virus.

## SOLAR EXPOSURE

Exposure to sunlight has been implicated in Carcinoma of the lip.

## DENTITION

Poor dentition may be associated with cancer of oral cavity.

## PRE MALIGNANT LESIONS

## LEUKOPLAKIA

The WHO defines leukoplakia as a while keratotic plaque that cannot be rubbed off and cannot be given another diagnostic name. Oralleukoplakia is the most precancerous lesion of oral cavity. 4% to 18% of oral leukoplakia eventually transform into invasive cancers. Morphologic characterstics of OLK that may increase the risk of malignant transformation are

- Red or erosive components
- Verrucous hyperplasia pattern
- Microscopic dysplasia

## ERYTHROPLASIA

Is a clinical term that defines a red mucosal plaque that does not arise from an obvious mechanical or inflammatory cause. EP has been associated with an even greater risk of malignancy than oral leukoplakia. EP is seen in 1% to 3% of OLK.

## DYSPLASIA

Is a histologic term that describes varying degrees of abnormal epithelial changes.

## VERRUCOUS HYPERPLASIA

Is an irreversible, probably premalignant lesion often histologically indistinguishable from verrucous carcinoma, that is an early from of that neoplasm.

# CHAPTER – 6

# PATHOLOGY

Squamous cell Carcinoma was graded histologically in 1920 by Borders.

Well differentiated Carcinoma have minimal pleomorphism and few mitoses and poorly differentiated cancers have extensive plemorphism minimal Keratinisation and frequent mitoses.

Oral cancer generally refers to squamous cell Carcinoma of oral mucosal origin, which accounts for more than 90% of all malignancies.

## SQUAMOUS CELL CARCINOMA

More than 90% of cancers of oral cavity are SCC. Squamous cell Carcinoma is usually described an either exophytic or ulcerative or a mixture of both i.e. ulcer proliferative.

The exophytic type is less common and carries a better prognosis. It has more superficial involvement and a slow growth pattern. Deep infiltration of sub mucosal tissue occurs in advanced stages. This type of SCC commonly occurs on the lips.

The ulcerative type is seen as a graying ulcer with heaped up edges and bleeds easily. This type tends to deeply infiltrate and usually has a high histologic grade.

## BASALOID SCC

Is an aggressive form of squamous cell Carcinoma.

## VERRUCOUS CARCINOMA

Uncommon variant of SCC represent less than that of 5% of all oral cancer. It is considered as a low grade malignancy. Verrucous carcinoma rarely metastasises. Therefore, elective neck dissection is not warranted. Radiation induced anaplastic transformation has been reported in multiple studies.

## REGIONAL METASTASIS

The most important factor in the prognosis of patients with SCC of the oral cavity is the status of cervival lymph nodes. The cure rate dramatically reduces by 50% by metastasing into cervical lymphnode. The occult metastatic rate is 10% and is near 20% for stage II disease.

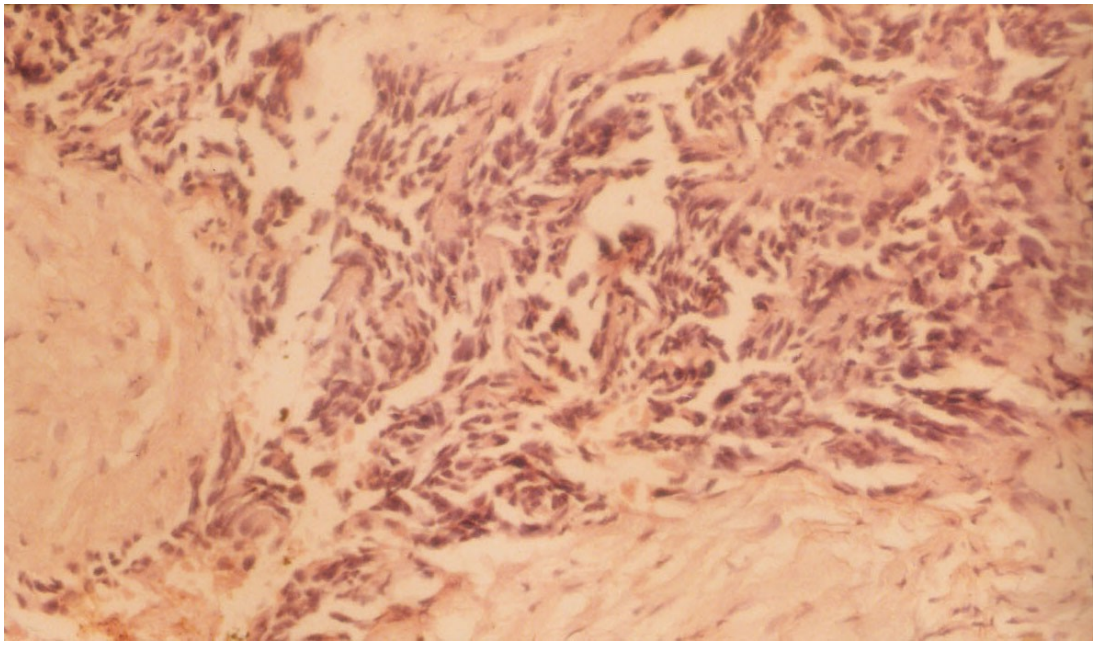
## DISTANT METASTASIS

Squamous cell carcinoma of the head and neck tends to remain localized for a period of time at the primary site and regional lymphnodes. Distant metastasis eventually occurs in 15 – 20% of patients with oral cancers.

The presence of advanced disease and failure at the primary site and neck after therapy are often associated with a high risk of distant metastasis.

The most common site of distant metastasis is the lung, followed by the liver and bone. As a result of current therapies excellent Loco

regional control of disease is being achieved. However, a general trend toward an increasing number of distant metastasis is being manifested. Effective modes of systemic chemotherapy are currently being developed to address this problem.



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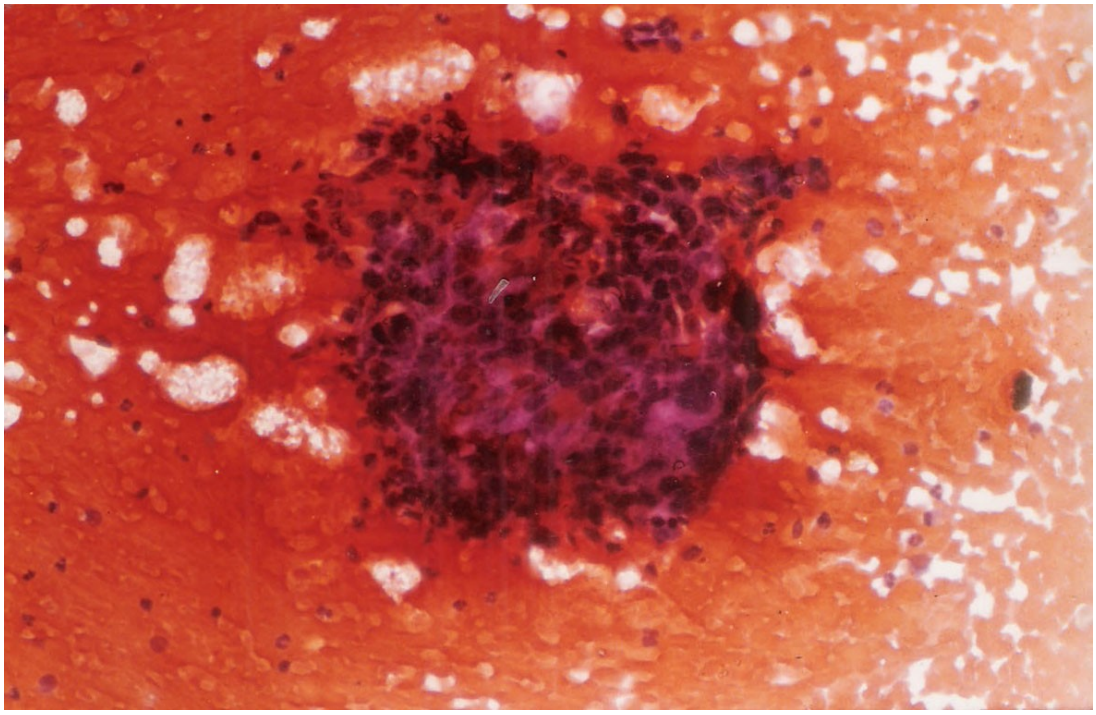


**FNAC OF SQUAMOUS CELL CA**

## CHAPTER – 7

## CLINICAL FEATURES & DIAGNOSIS

The commonly presenting age group is around 4th & 5th decade with strong association of tobacco, alcohol and smoking and presents with either ulcer or growth or ulcero proliferative growth over the site of affection. Pain is a late feature. Excessive salivation, ankyloglossia are associated with ca tongue. Dribbling of saliva is associated with ca angle of mouth.

### DIAGNOSIS

I In experienced hands the application of TOLUIDINE BLUE DYE can be a useful tool. The sensitivity is about 90 – 95% and specificity is around 75 – 90% in extremely high risk population.

II Exfoliative cytology is studied in various groups but it is not substitute for an adequate biopsy.

III BIOPSY – The role of biopsy plays a main diagnostic tool in oral Malignancy.

Bioopsy may be
- Punch Biopsy
- Wedge Biopsy
- Excisional Biopsy (< 1cm lesion)

IV CT Scan and MRI scan

Imaging techniques have improved the accuracy of staging but cannot determine if nodal enlargement is due to reactive changes or malignant involvement.

Both lacks sufficient sensitivity and specificity to replace elective neck dissection for both staging and prognostic purposes.

V Routine hemogram, chest radiography, ultra sonogram abdomen (in selective cases) and LFT Selective cases)

VI DENTAL CONSULTATION

VII LARYNGOSCOPY, BRONCHOSCOPY and ESOPHAGOSCOPY for more accurate assessment in certain cases and for presence of another primary.

**T2 N0 M0 – CA CHEEK**

**T4 N1 M0 – CA CHEEK**

**T2 N1 M0 – CA CHEEK**

**T4 N1 M0 – CHEEK**

**T4 N2 M0 – CA CHEEK**

# CHAPTER – 8

## STAGING AND SCREENING

TNM staging system is a clinical staging system that allows to design treatment modality, compare results and assess prognosis.

### PRIMARY TUMOUR (T)

$T_x$ - Primary tumour cannot be assessed

To - No evidence of primary tumour

$T_{is}$ - Carcinoma in situ

$T_1$ - Tumour not more than 2cm in greatest dimension

$T_2$ - Tumour more than 2cm and not more than 4cm in greatment dimension

$T_3$ - Tumour more than 4 cm in greatest dimension

$T_4$ - Tumour invades adjacent structures

(Skin, bone and deep muscles)

### NODAL INVOLVEMENT

$N_x$ - Nodal status cannot be assessed

$N_o$ - No regional lymph node

$N_1$ - Presence of single Ipsilateral lymph node not more than 3 Cms in greatest dimension

$N_2$ - $N_{2a}$ single Ipsilateral lymph node more than 3 Cms but not more than 6 Cms in greatest dimension.

$N_{2b}$ Multiple ipsilateral lymph nodes not more than 6 Cms in greatest dimension

$N_{2c}$ Bilateral / contralateral lymph node not more than 6 Cms in greatest dimension

$N_3$ - Lymph nodes on any side more than 6 Cm in greatest dimension

**DISTANT METASTASIS**

$M_x$ - Distant Metastasis not assessed

$M_o$ - No distant metastasis

$M_1$ - Presence of distant metastasis

**Stage Grouping**

Stage I $T_1 N_o M_o$

Stage II $T_2 N_o M_o$

Stage III $T_3 N_o M_o$

$T_{1-3} N_1 M_o$

Stage IV $T_4 N_{o-1} M_o$

Any T $N_{2-3} M_o$

Any T Any N $M_1$

## LIMITATION OF TNM STAGING

### Tumour

Assessment of extent of primary can be different for istance distinguishing a $T_1$ $V_S$ $T_4$ is relatively easy. However it may be difficult if a 3Cm cancer near retromandibular regn has a mandibular invasion.

Invasion into FOM musculature can also be difficult to asses and again cause difficulty in distinguishing $T_2$ $V_S$ $T_4$ disease.

### NODE

Important prognostic factor such as fixation of nodes and level of nodal status not included. False negative physical examination varies from 16 – 60%.

## SCREENING

The most extensively studied screening procedure has been oral exfoliative cytology which has been recommended by American Dental Association. A high proportion of false negative examination have been reported with this procedure.

Another screening method used frequently has been toludine blue staining of aerodigestive mucosa. Toludine blue is a metachromatic nuclear stain that is taken up by dysplastic and cancerous epithelium. False positive results are around 9% and false negative result around 5%.

Standardized physical examinations is the best means of detecting lesion of the upper aerodigestive tract.

## PREDICTORS OF NODAL DISEASE

### TUMOUR THICKNESS

There is an association between thickness of primary tumour and incidence of nodal metastasis.

### DIFFERENTIATION

There is a direct correlation between grade of primary tumour and cervical node metastasis.

### VASCULAR & PERINEURAL INVASION

Regional node metastasis was significantly increased in patients with perineural spread.

## PROGNOSTIC EVALUATION

This is mainly based on clinical staging of tumour. Prognosis can be predicted by various histologic, molecular and cellular characteristics of primary tumour and lymphnodes.

## CYTOMORPHOMETRIC PARAMETERS

Morphologic methods such as size, volume cell number and cell morphology are objective measurement of tumour characteristic. A few reports indicate a poor prognosis for oral premalignant lesions with increased nuclear size and alteration in nuclear morphology.

## CELLULAR PROLIFERATION

A rapid growth rate is associated with poor prognosis. An ↑ expression of structures such as K1-67 antigen and EGF-R are associated with proliferation at invading tumor margin. The EGF-R has been shown to be present primarily in poorly differentiated cells.

## GENETIC

Abnormalities in DNA-Mutation and detection are involved in uncontrolled tumour growth.

C-myc oncogenic amplification H-ras and C-myc messenger RNA have been observed in less differentiated cells at the invasive margin of the tumour.

## CELL SURFACE CARBOHYDRATE

Loss of expression of deletion of H antigen on cell are associated with presence of metastasis.

## NODAL CHARACTERISTICS

Positive nodes are associated with poor prognosis when compared with negative node.

Multiple nodal metastasis carries worse prognosis than involvement of single node metastasis.

Fixation is not included in TNM staging.

Extranodal spread is associated with 50% reduction survival when compared with nodes without ENS.

Patients with level 4 & 5 involvement have a worse prognosis.

Nodes with lymphocyte predominant pattern is qassociated with a good prognosis.

# CHAPTER - 9

# PRINCIPLES OF RADIOTHERAPY

Cancers of the oral cavity are of particular importance to radiation oncologist. They have an active role in early and advanced disease. The twin advantage is easy accessibility by External beam (XRT) and brachy therapy as well as tolerance of normal tissue.

## INDICATORS

- **Tumour Control**

  Particularly small tumour $T_1$ – $T_2$ are equally well controlled by radiotherapy or surgery.

- **Pre Surgical**

  A dose of 50 Gy is delivered to the primary tumour and regional nodes with double aim to reduce the tumour size and to kill tumour cells that are likely to be spilled during surgery.

Disadvantage

Wound healing – delayed due to fibrosis, infection

Assessment of tumour margin will be difficult during surgery.

- **Post Surgical**

  In complete resection (upto 60 – 70 Gy dose given depending upon stage and grade of tumour.

When elective neck dissection is first choice, RT given depending upon histological grade.

Adv : 1. Sterilization of residual microscopic cells

2. Better assessment of tumour margin

Dis : Surgical complication may delay induction of Radiotherapy.

**Elective treatment of clinically negative nodes**

If a high rate of relapse is expected in the neck nodes, more than 90% of cases can be prevented by delivering 40 – 50 Gy to the neck.

**Relapsing tumour after surgery**

When salvage surgery is not feasible, salvage radiation therapy can be tried, although often with poor outcome due to tumour load, poor vascularisation and patients general condition.

**Palliation**

When tumour is condisered surgically (or) radio therapeutically incurable a few high dose fraction are given in order to ↓ symptoms such as pain & bleeding.

## TECHNIQUES OF RADIO THERAPY

## EXTERNAL BEAM RADIOTHERAPY (XRT)

### XRT as sole treatment with curative intent

70 -75 Gy to the tumour, 65 – 70 Gy to clinically positive nodes, elective neck node irradiation 45 – 50 Gy.

### XRT with brachy therapy

XRT to tumour and primary nodes is started upto a dose of 45 – 50 Gy followed by an interstitial implant (1 – 2 week later) with iridium wires delivering dose 25 – 30 Gy.

### XRT followed by surgery

50G are given to tumour site and neck nodes.

### XRT after surgery

When the local resection is sufficient no post op radiation given except in $T_4$ where a dose of 60 Gy reduces the risk of local recurrence.

When there are positive nodes 50 Gy is sufficient to control the neck but may be increased to Gy when there is capsular rupture or perineural spread or tumour spillage is suspected.

**Advantage of XRT**

Centripetal shrinkage of tumour

Sterilises lymphatics

Allows adequate clearance

In advanced posteriorly placed tumour or illdefined primary that would make surgical exposure difficult, functional disability (speech / deglutition) is less.

**Disadvantage**

Tumour that have deep invasion or large ($T_3$ $T_4$) are less responsive to XRT.

Second course XRT cannot be considered.

Salvage surgery for radiation failure is associated with low survival and high morbidity.

Side effects of irradiation like Xerostomia, mucositis and osteoradionecrosis.

**BRACHY THERAPY**

Indication

Well defined and accessible T1 & T2 tumour

Advantage

Conservative treatment

Well defined volume

## SIDE EFFECTS OF RADIOTHERAPY

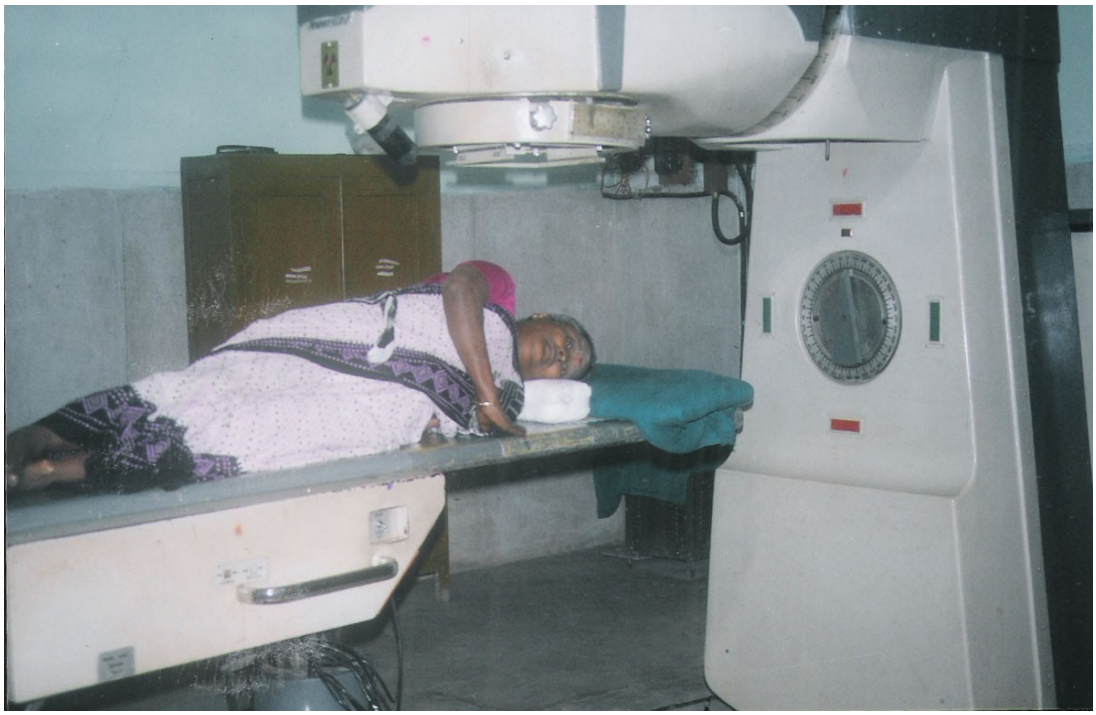
Acute

- Mucositis
- Dry mouth
- Loss of taste
- Dysphagia or dyspnoea
- Erythema & Epidermolysis

Late

- Soft tissue necrosis
- Osteroradionecrosis of mandible predisposed by
    - Dose delivered to maindible
    - Mandibular parts not covered by healthy mucous
    - Dental extraction within 10 days of brachy therapy
- Hypothyroidism

**RADIOTHERAPY UNIT**



**PT. RECEIVING RADIOTHERAPY**

# CHAPTER - 10

## PRINCIPLES OF SURGERY

Early stage disease $T_1$ – $T_2$ can be managed either by radiotherapy or surgery to give equally good results. Advanced lesion need a combination of both radiotherapy and surgery with or without chemotherapy.

Nodes larger than 3 cms, nodes with capsular infiltration and multiple metastatic nodes need multimodality treatment.

When combination of surgery or radiotherapy is used, either could be tried first depending on the philosophy of treating institution.

Margins of surgical resection vary from site tosite. +ve surgical margin carries poor prognosis and should be avoided by frozen section histopathology of close or doubtful margin.

Primary reconstruction of surgical defects with well vascularised flaps should be done in most cases. This allows prompt healing, early resumption, effective rehabilitation and shorter hospital stay,

Appropriate corrective pre operative preparation is necessary.

Pre operative thought and planning in detail is required to help to overcome post surgical deficiencies.

**Advantages**

- Many cancers of oral cavity are amanable to surgical excision perorally.
- Surgical treatment is preferred in patients with advanced tumour and those with mandibular invasion.
- Requires less time & provides fewer longterm sequelae.

**Disadvantage**

- Potential risk of anaesthesia
- Functional disabilities
- Cost

**Available surgical procedures for primary**

- Wide excision
- Composite oral resection
- Composite oral resection with hemimandibulectomy
- Maxillectomy
- Hemiglossectomy

**Mandible**

Oral cavity cancers are often about to involve mandible. Invasion of mandible is not radiocurable and can spread perinerally via inferior alveolar nerve. CT is the preferred adjunctive diagnostic test

for mandibular involvement. In these cases composite resection is the procedure of choice.

Direct invasion requires hemimandibulectomy, tumour approaching but not invading needs marginal mandibulectomy.

**CERVICAL NODE METASTASIS**

**RADICAL NECK DISSECTION**

Here internal jugular vein, spinal accessory nerve, and sternomastoid are resected along with lymphatics in neck. The carotid artery, phrenic, vagus, sympathetic trunk, hypoglossal and lingual nerve are preserved.

RND is contra indicated in presence of uncontrolled primary, distant metastasis and fixed nodes.

**MODIFIED NECK DISSECTION**

Which could be

- Functional neck dissection
- Selective neck dissection
  - Submandibular dissection
  - Suprahyoid dissection
  - Anterior neck dissection
  - Posterior neck dissection
- Extended neck dissection / Supra omohyoid

Prophylactic neck dissection is indicated in places where primary is in one of the biologically aggressive site

i.e. Tongue

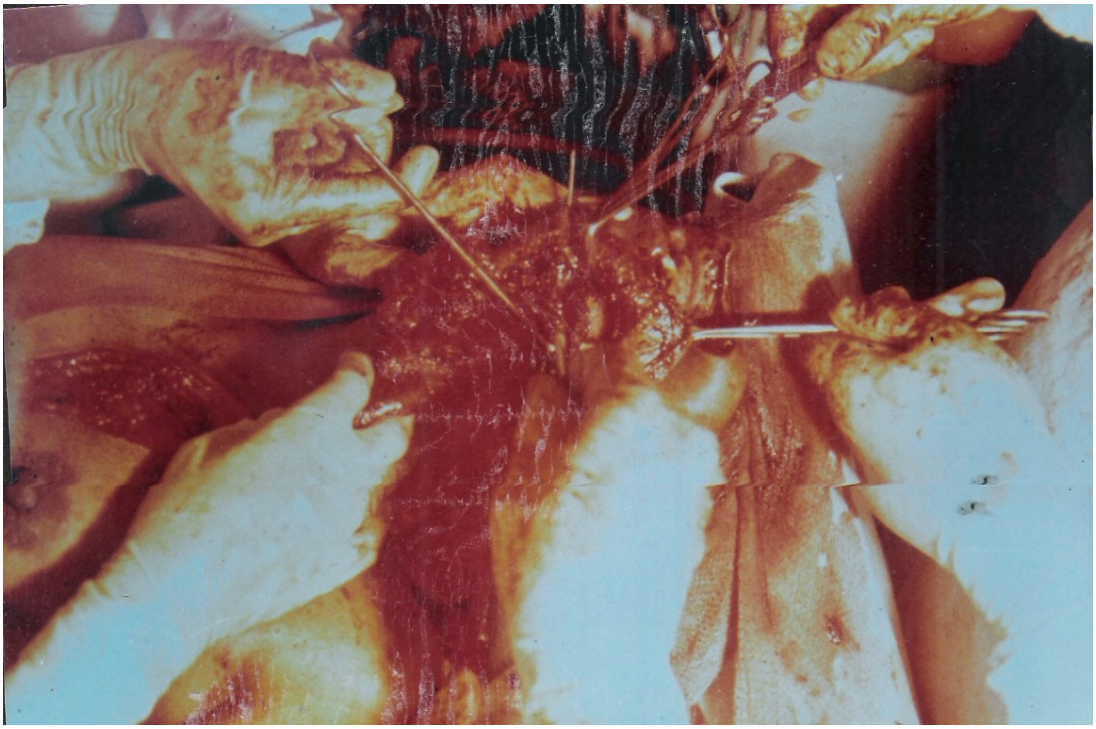
FOM

Alveolus

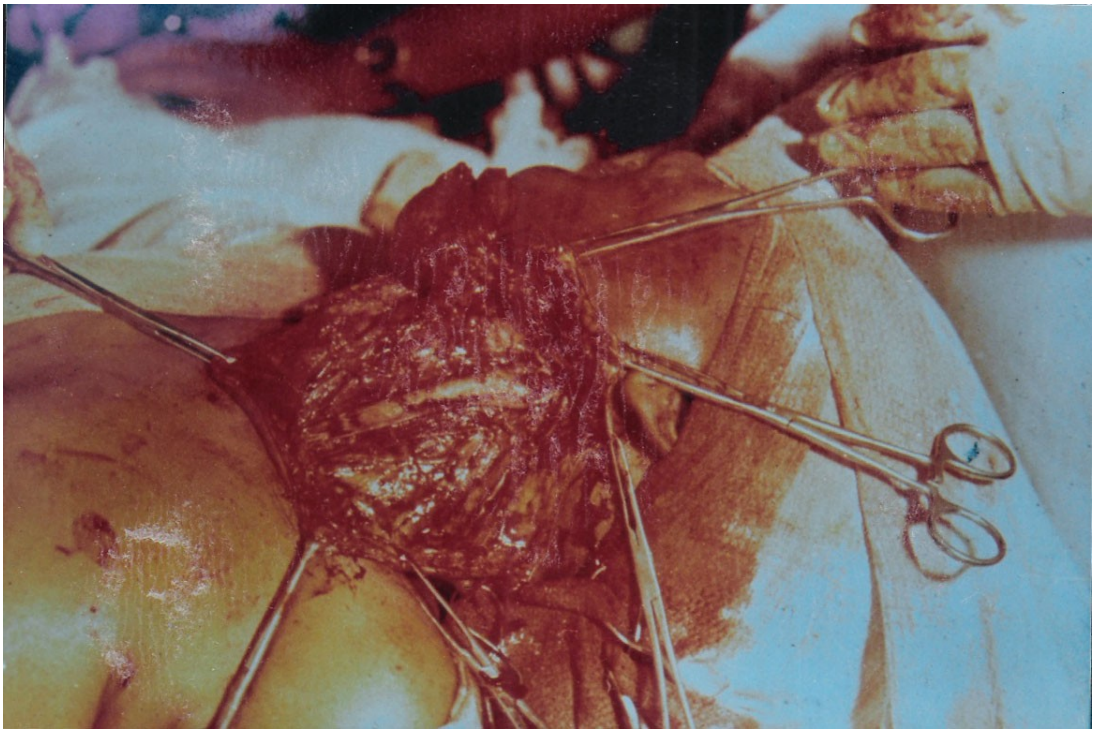
Soft palate

**COMPOSITE RESECTION**

**COMPOSITE RESECTION**



**NECK DISSECTION**



**NECK DISSECTION**

**MODIFIED CRILE'S INCISION FOR NECK DISSECTION**

**PMMC FLAP**

**PMMC – IMMEDIATE POST - OP**

**PMMC – LATE POST - OP**

## CHAPTER – 11

## PRINCIPLES OF CHEMOTHERAPY

For an advanced Loco regional disease combination modality is useful Role of chemotherapy is as follows.

I. Palliative - in recurrent cases after surgery and / or radiotherapy

II. Previously untreated cases

Neo adjuvant chemotherapy

Adjuvant chemotherapy

Concurrent chemotherapy

Commonly used drugs are :

| | **Response rate** |
|---|---|
| Metho trexate | 31% |
| Bleomycin | 21% |
| Cisplatinum | 28% |
| 5FU | 15% |
| Paclitaxel | 38% |
| Docetaxel | 38% |
| Carboplatin | 22% |
| Ifosfamide | 26% |

It can be infused (or) perfused locally, infusion after ligation of external carotid. A beyond superior thyroid A to avoid eddy current & thrombus formation.

Role of chemotherapy in oral cancer is still evolving and seems promising.

# CHAPTER – 12

# RECONSTRUCTION

The object of reconstruction is to restore the form and function in the least possible time and in most economic manner.

The reconstruction of the post excisional defect in the same sitting is the rule, except when there is doubt about the adequacy of resection or general condition of patient does not permit extended surgery.

All post excisional wound must be provided with immediate cover. Such a cover may be provided by

- Primary closure
- Split skin graft
- Local graft
- Skin and other tissue brought from distant site
- Free flap micro vascular anastomosis

## SPLIT SKIN GRAFT

Several problems are associated with the use of split thickness graft. Although they remain moist, they aways appear white because of desquomation. They cannot fill the cavity or cover the exposed bone or irradiated bed and they may contract. This is excellent procedure where bed is suitable.

## FULL THICKNESS GRAFT

In areas where contraction is undesirable full thickness graft may be useful. A hairless donor site should be selected to prevent intra oral hair growth.

## MUCOUS MEMBRANE GRAFT

Mucous membrane is the tissue of choice if free graft are indicated but rarely is enough, available to be of practical value.

## LOCAL FLAPS

They are readily available in operative field and are not subject to mary of the problems of the graft.

- Forehead flap

  M. Narayanan used bipolar flaps
- Sternomastoid myocutaneous flap
- Tropezius flap
- Platysma myocutaneous flap
- Tongue flaps
- Naso labial flap

## REGIONAL ARTERIALIZED FLAPS

These can provide tissue with a robust blood supply from non radiated site to fill the defect without the need of micro vascular anastomosis.

Deltopectoral flap

Latissmus myocutaneous flap

Pectoralis major myocutaneous flap

**FREE FLAPS**

Recent advances and refinements in micro vascular surgery have enabled reconstructive surgeons to transfer composite section of tissue to distant site in single operative procedure when indicated. Three free tissue transfers can supply vascularised external cover with vascularised bone and internal lining of skin or mucosa to restore the pre operative functional anatomic unit and aesthetics to the patient.

- Free jejunal transfer
- Free osteocutaneous groin flap
- Radial forearm flap (Chinese flap)

# CHAPTER – 13

# REVIEW OF LITERATURE

More than 100 000 cases of oral cancer occur every year in South and South-East Asia, with poor prospect of survival : about 90% of these cases are attributable to smoking and chewing habits.-[1] It is also encouraging that overall rates in India are showing a decreasing trend in successive birth cohorts, particularly among females for intraoral sites other than tongue (ICD9 143-145), where a mean percentage fall of 16.8% has occurred between 1975 and 1988, although rates remain in the high range of 1015/100 000 per annum. In Mumbai (Bombay), the incidence of tongue cancer was high : it was 14.9/100 000 per annum (aged 3074, standardized to the world population) for men and 5.4 for women, but both values showed a fall, of 12.0 and 16.8% respectively, between 1975 and 1988.[2] Unfortunately, it cannot be assumed that these trends apply nationwide and there is growing concern that commercial areca nut and tobacco products will contribute to future rises in the incidence of oral submucous fibrosis and of oral cancer.[3] Furthermore, decreases in the prevalence of traditional pan-chewing habits in the more sophisticated urban areas are more than matched by increases in smoking.

There is absolutely no doubt that on a global scale the use and abuse of tobacco products is the major cause of oral cancer.[4,5] Alcohol us synergizes with tobacco as a risk factor for upper aerodigestive

tract SCCs : this synergism is super-multiplicative for the mouth, additive for the larynx and between additive and multiplicative for the oesophagus.[6] Sorting out the independent effects is difficult, however, because these habits usually overlap. Many believe that the rising incidence of oral cancer in Europe and elsewhere in the Western world is largely due to increasing alcohol consumption. In many developing countries, particularly in the Islamic world and in Moslem communities every where, accurate data on alcohol consumption are impossible to obtain because of religious and cultural inhibitions.

## Evidence from case-control studies

The carcinogenicity of pan/betel quid mixtures has been clearly established in a meta-analysis of 17 pubilshed studies by Thomas and Wilson.[7] These show a range of relative risks (RRs) averaging around 10. However, as pointed out by Warnakulasuriya,[8] only four studies differentially examine the role of betel quid with and without tobacco, and with or without smoking, in cases of oral cancer in South Asian populations. It is clear that tobacco is the major carginogen, possibly partly because its presence adds to the compulsion to chew more frequently.

## Evidence from prospective studies

Gupta et al.[9] followed up 30 000 individuals more followed up over a 10-year period in three areas of India. In Ernakulum the annual age-adjusted incidence of oral cancer was 23/100 000 among betel

quid-tobacco chewers compared with zero in smokers and non-habitues : this is the most extensive study of its kind reported.

The most comprehensive source of evidence remains the IARC publication of 1986.[10] This evidence is also summarized by the US Surgeon-General's Report of 1989 which lists attributable risk (AR) for cancer at various sites : the upper aerodigestive sites with which we are here concerned have the highest ARs, in males, of all the many sites for which smoking has been identified as playing a role.

Beedi (bidi) smoking, as practised in the Indian sub-continent, is more hazardous than cigarette smoking.[11] Mashberg and Meyers[12] reported in a US population in 1976that 201 of 207 (90%) asymptomatic primarily erythroplastic carcinomas were in 3 locations floor of mouth, ventral or lateral tongue and soft palate complex. In the Amsterdam series[13] the floor of mouth and retromolar area were significantly more related to tobacco use than were cancers of the tongue and cheek.

Over 300 carcinogens have been identified in tobacco smoke or in its water –soluble components which can be expected to leach into saliva.[14]

In has been known since the 1920s that polycyclic aromatic hydrocarbons (PAHs) were the carcinogenic agents present in tars, and this lies behind the tobacco industry's promotion of 'low tar' smoking materials, while continuing to promote 'full strength' brands. Benzo(a) pyrene is a powerful carcinogen and is found in amounts of

20-40 ng per cigarette. The role of N-nitrosamines is reviewed by Hoffman and Hecht.

Polymorphisms of the p450 and GST genes are currently under active study in the search for genetic markers of susceptibility to head and neck cancer, and indeed to tobacco-related cancers at many other body sites.[15,16]

Recreational users of marijuana often also enjoy alcohol and tobacco, and tobacco usually forms part of the marijuana smoking mix.

Pure Alcohol and oral cancer pure ethanol has never been shown to be carcinogenic in vitro or in animal studies.[17,18]

Nevertheless, some cohort and case – control studies have found an increased risk of upper aerodigestive tract cancer associated with alcohol drinking in nonsmokers.[19]

In many parts of the Indian subcontinent, for example, local brews distilled from palm juice, 'toddy', are widely available particularly in rural areas where tobacco habitues may be unable to afford factory made (and therefore quality- controlled) beverages, whether they be of national origin or imported. Recent studies in South India demonstrate a clear role for alcohol.

There are several ways in which alcohol is thought to contribute to head and neck cancer, by both local and systemic mechanisms. The IARC Monograph deals comprehensively with the evidence up to the late 1980s.[17] The mechanisms are as follows:

- There is now clear evidence that ethanol increases the permeability of oral mucosa to water itself[22,23] and to many water-soluble molecules, probably including important carcinogens : indeed, increased passage of nitrosonornicotine has been demonstrated in in vitro experiments.[24,25] The effect is greater at 15% than at 5%, but is not further enhanced at 40% ethanol, suggesting the epithelial permeability barrier rather than to lipid extraction.[26,27] This means that there will be increased uptake of alcohol itself, and of carcinogens, with enhanced systemic effects. It also implies a solvent action of ethanol on keratinocyte membranes with likely enhanced penetration of carcinogens into proliferating cells where they may exert a direct mutagenic action.[28] A dehydrating effect may contribute.[29] Recent animal experiments in which rats were fed ethanol by stomach tube showed an indirect effect on the permeability of the oral mucosa, because there was decreased synthesis of lipids contributing to the intercellular permeability barrier, perhaps because of liver damage.[30]
- The immediate metabolite of ethanol is acetaldeyde. Some of thism ay be formed locally and damage cells.[31] Indeed considerable amounts of acetaldehyde can be found in saliva after moderate alcohol consumption, owing to the action of bacterial alcohol dehydrogenases.[32] Production is signifciantly reduced after three days' use of an antiseptic mouthwash (chlorhexidine), perhaps helping to explain why poor oral hygiene appears to be an independent risk factor for oral cancer

in some studies.[33-35] Those genetically predisposed to be more rapid acetylators have been demonstrated to be at increase risk in one recent US study.

- Alcoholic liver disease is common in heavy drinkers and this reduces the detoxification of active carcinogens.[19]
- Alcohol is high in calories, which suppresses appetite in heavy drinkers. Those with a serious drinking problem become socially fractured, and many choose to spend available cash on drink rather than food. All of this contributes to inadequate diet. Metabolism is further damaged by liver disease. As a result nutritional deficiencies are common,[36] and, as discussed below, these contribute significantly to lowered resistance to cancer.[19]

Unsurprisingly, therefore, alcoholic patients are at especial risk for head and neck cancer, particularly at sites in direct contact with alcohol.[37]

Conversely, 'high-risk' HPV types are those associated with premalignant lesions and squamous cell carcinomas – again, most of the evidence coming from anogenital lesions. Among these HPVs 16, 18, 31, 33, 35 and 39 are found most commonly.[38-40] Their viral genomes can become integrated and transcriptionally active in tumours and tumour cell lines, such that the IARC has classified HPV 16 and 18 as carcinogenic in humans (group 1), HPV 31 and 33 as probably carcinogenic in humans (group 2a) and some others as possibly carcinogenic in humans (group 2b); the latest evaluations can be found at the IARC Homepage (http://www.iarc/fr/). Nevertheless,

even the high-risk HPVs do not appear to be directly carcinogenic, but seem to require additional modifications of host – cell genes, brought about by physical or chemical carcinogens or other viral infections.[40,41]

The E6 and E7 ORFs of the high –risk HPVs are particularly important because they encode transforming proteins, and can thus be regarded as viral oncogenes, They are though to act by binding to and inactivating, the important cell-cycles regulatory tumour suppressor gene proteins p53 and pRb, respectively.[42]

**Papilloma viruses and oral cancer**

HPV 16 is the most common type to be associated with both cervical and oral cancers.[43,45] In vitro studies show that primary human oral epithelial cells can be immortalized by high-risk HPV types;[44,46] however, exposure to tobacco – related chemicals was required for these cells to progress to a fully malignant phenotype.[47,48]

## CHAPTER - 14

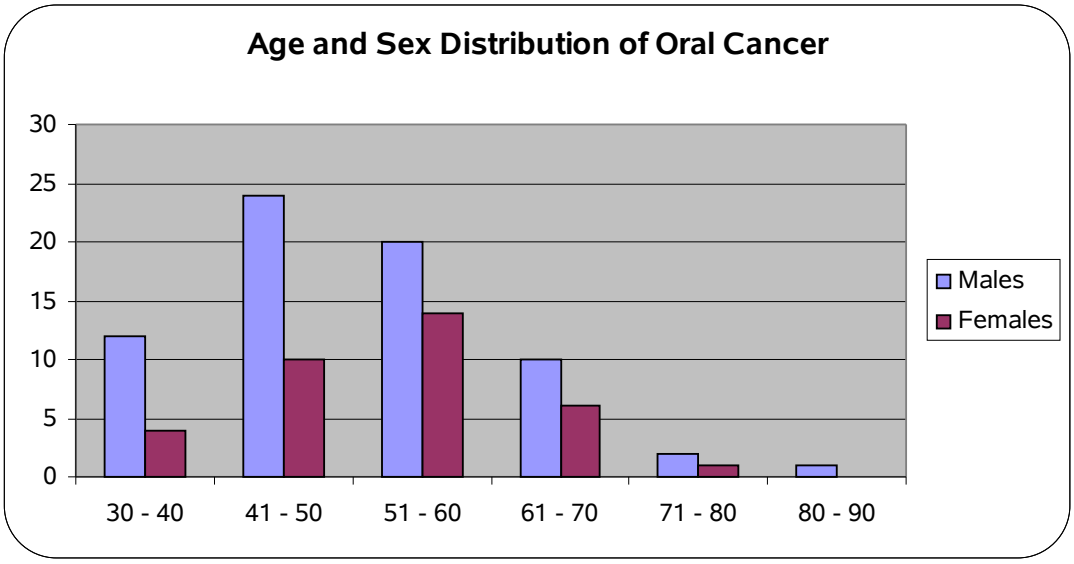
## OBSERVATIONS & DISCUSSION

A total of 104 patients were treated at the oncology department of Govt. Royapettah Hospital from Oct 2004 to Mar 2006.

The table below shows age wise & sex wise distribution of oral cavity cancer.

**TABLE - 1**

| Age | Males | Females | Total |
|---|---|---|---|
| 30 - 40 | 12 | 4 | 16 |
| 41 - 50 | 24 | 10 | 34 |
| 51 - 60 | 20 | 14 | 34 |
| 61 - 70 | 10 | 6 | 16 |
| 71 - 80 | 2 | 1 | 3 |
| 80 - 90 | 1 | 0 | 1 |

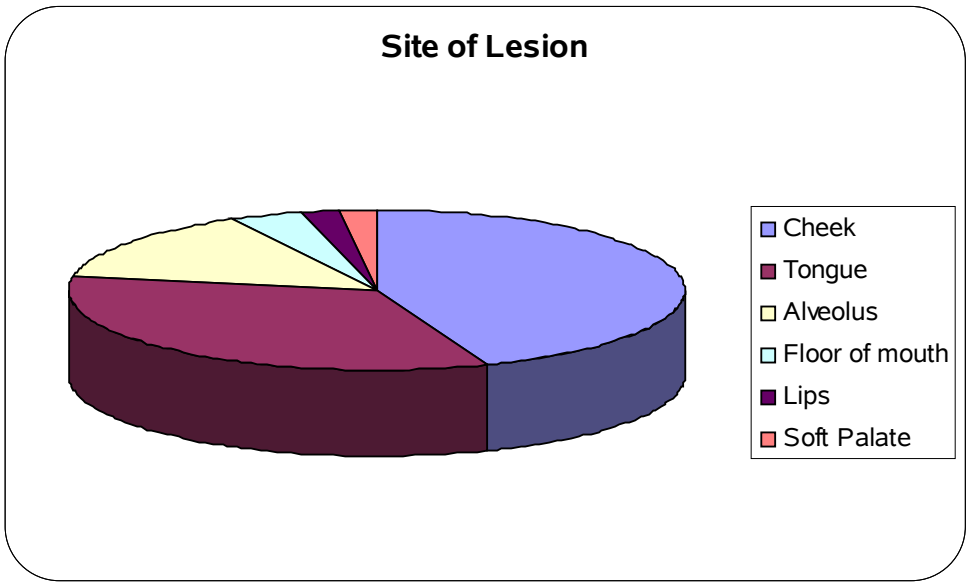



The highest incidence of oral cavity cancer occurred during 5th & 6th decades of life constituting 68% of cases.

A definite male predominance was noticed, 63% of them were males.

**TABLE – 2**

| Site of lesion | No. of patients |
|---|---|
| Cheek | 46 |
| Tongue | 35 |
| Alveolus | 15 |
| Floor of Mouth | 4 |
| Lips | 2 |
| Soft Palate | 2 |




The commonest site of oral cavity cancer was cheek, then cancer tongue.

**TABLE - 3**

| Primary Lesion | | Nodal Status | | Metastasis | |
|---|---|---|---|---|---|
| $T_0$ | - | $N_0$ | 22 | $M_0$ | 104 |
| $T_1$ | 5 | $N_1$ | 24 | $M_1$ | - |
| $T_2$ | 12 | $N_{2A}$ | 15 | | |
| $T_3$ | 29 | $N_{2B}$ | 20 | | |
| $T_4$ | 58 | $N_{2C}$ | 12 | | |
| | | $N_3$ | 11 | | |

Majority of patients presented with advanced disease. Maximum numbers in $T_4$ & $N_2$ groups ($T_4$ – 55%, $N_2$ – 45%). There is a strong association with risk factors in Ca oral cavity. 95% of cases of Ca check is associated with Tobaco chewing with or without betel nut, 80% of Ca tongue cases is associated with tobacco chewing with betel nut.

**TABLE - 4**

| Site | Primary RT | Palliative RT |
|---|---|---|
| Cheek | 20 | 10 |
| Alveolus | - | 4 |
| Tongue | 9 | 8 |
| Lip | - | 1 |
| Soft palate | 1 | 1 |
| Floor of Mouth | - | 2 |

The response to RT was excellent in $T_1$ & $T_2$ disease. Response was not good in late disease. Pall RT was given in 26 patients.

17 patients were taken for primary surgery.

**TABLE – 5**

| | |
|---|---|
| Wide Excision | 7 |
| Composite Resection | 10 |

**TABLE – 6**

| Procedure of Reconstruction | No. of cases |
|---|---|
| PMMC | 9 |
| Oral Flap | 4 |
| Nasolabial Flap | 1 |
| SSG | 3 |

Salvage surgery was done in 10 patients.

# CHAPTER - 15

## RESULTS, SUMMARY & CONCLUSIONS

104 patients were treated for oral cavity cancer at Department of Oncology Govt. Royapettah Hospital, from Oct 2004 to Mar 2006.

Highest incidence was seen at $5^{th}$ & $6^{th}$ decades of life and majority of them were males. Cheek is the site commonly involved (45%), next comes tongue.

There is a strong association of the risk factor of Tobacco chewing with Ca cheek (95%).

Majority of patients presented with advanced disease. Maximum numbers in $T_4$ & $N_2$ groups ($T_4$ – 55%, $N_2$ – 45%).

30 patients completed primary RT apy, 26 patients underwent palliative radiotherapy. 31 patients discontinued treatment at various stages.

17 patients were taken up for primary surgery.

10 patients were taken for salvage surgery.

Action is required to encourage screening programmes while raising awareness of oral cancer among public and association with risk factors.

## BIBLIOGRAPHY


1. Park LY, Muscat JE, Kaur T et al. Comparison of GSTM polymorphisms and risk for oral cancer between African – Americns and Caucasians. Pharmacogenetic 2000; 10: 123 – 131.

2. Gronau S, Konig-Greger D, Rettinger C, Riechelmann H. GSTM1 gene polymorphisms in patients with head and neck tumors. Larynorhinootologie 2000; 79: 341 – 344.

3. Buch Sc., Notani PN, Bhisey RA, Polymorphism at GSTM1, GSTM3 and GSTT1 gene loci and susceptibility to oral cancer in an Indian population. Carcinogenesis 2002 ; 23:803 – 807.

4. Winn DM. Tobacco use and oral disesase J. Dent Educ 2001; 65: 306 - 312.

5. Johnson N. Tobacco use and oral cancer: a global perspective. J Dent Educ 2001; 65: 328 – 339.

6. Franceschi S, Talamani R, Barra S et al. Smoking and drinking in relation to cancers of the oral cavity, pharynx, larynx and esophagus in Northern Italy. Cancer Res 1990 ; 50: 6502 – 6507.

7. Thomas S, Wilson A. A quantitative evaluation of the role of betel quid in oral carcinogenesis. Eur J Cancer Oral Oncol 1993; 29B : 265 – 271.

8. Warnakulasuriya S. The role of betel quid in oral carcinogenesis. In: Bedi, R, Jones P (eds). Betel quid and tobacco chewing among the Bangladeshi Community in the United Kingdom. London : Centre for Transcultural Oral Helath, 1995 : 61 – 69.

9. Gupta PC, Mehta FS, Daftary DK et al. Incidence rates of oral cancer and natural history of oral precancerous lesions in a ten year follow up study of Indian villagers. Community Dent Oral Epidemiol 1980; 8 : 287 – 333.

10. International Agency for Research on Cancer, Tobacco smoking. IARC Monographs on the evaluation of carcinogenic risks to humans. Vol 38 Lyon: IARC, 1986.

11. Dikshit RP, Kanhere S. Tobacco habits and risk of lung, oropharyngeal and oral cavity cancer : a population – based case – control study in Bhopal, India. Int J Epidemiol 2000; 29 : 609 – 614.

12. Mashberg A, Meyers H. Anatomical site and size of 222 early asymptomatic oral squamous cell carcinomas : a continuing prospective study of oral cancer II. Cancer 1976; 37: 2149 – 2157.

13. Javonovich A, Schulten EAJM, Kostenser PJ, Snow GB, van der Waal I. Tobacco and alcohol related to the anatomic site of oral squamous cell carcinoma. J Oral Pathol Med 1993; 22: 459 – 462.

14. Hoffmann D, Hecht SS. Nicotine – Derived N- Nitrosamines and tobacco – related cancer ; current status and future directions. Cancer Res 1985; 45 : 935 – 944.

15. Lafuente A, Maristany M, Arias C et al. Glutathione and glutathione S-transferases in human squamous cell carcinomas of the larynx and GSTM1 – dependent risk. Anticancer Res 1998 ; 18: 107 – 111.

16. Hung HC, Chuang J, Chien YC et al. Genetic polymorphisms of CYP2E1, GSTM1 and GSTT1; environmental risk factors and risk of oral cancer. Cancer Epidemiol Biomarkers Prev 1997; 6: 901 – 905.

17. International Agency for Research on Cancer. Alcohol drinking. IARC monographs on the evaluation of carcinogenic risks to humans. Vol. 44. Lyon : IARC, 1988.

18. Tuyns AJ. Alcohol and cancer. Proc Nutr Soc 1990 ; 49: 145 – 151.

19. Kato I, Nomura AM. Alcohol in the aetiology of upper aero – digestive tract cancer. Eur J Cancer Oral Oncol 1994; 30B: 75 – 81.

20. Balaram P, Sridhar H, Rajkumar T et al. Oral cancer in southern India : the influence of smoking, drinking, paan-chewing and oral hygiene. Int J Cancer 2002; 98: 440-445.

21. Iype EM, Pandey M, Mathew A, Thomas G. Sebastian P, Nair MK. Oral Cancer among patients under the age of 35 years. J Postgrad Med 2001; 47: 171 176.

22. Lesch CA, Squier CA, Cruchley A et al. The permeability of human oral mucosa and skin to water J Dent Res 1989; 68: 1345 – 1349.

23. Hsu TC, Furlong C, Spitz MR. Ethyl alcohol as a co-carcinogen with special reference to the aerodigestive tract: a cytogenetic study. Anticancer Res 199; 11: 1097 – 1102.

24. Squier CA, Cox P, Hall BK. Enhanced penetrationof nitrosonornicotine across oral mucosa in the presence of ethanol. J Oral Pathol 1986; 15 : 276 – 279.

25. Du X, Squier CA, Kremer MJ, Wertz PW. Penetration of N – nitrosonornicotine (NNN) across oral mucosa in the presence of ethanol and nicotine. J Oral Pathol Med 2000; 29: 80 – 85.

26. Howie NM, Trigkas TK, Crichley AT, Wertz PW, Squire CA, Williams DM. Short – term exposure to alcohol increases the permeability of human oral mucosa. Oral Dis 2001; 7: 349 – 354.

27. Tregkas TK, Cruchley AT, Williams DM, Wertz P, Squire CA. Human oral mucosal permeability is increased by short term exposure to ethanol. J Dent Res 1993; 72 :694.

28. McCoy Gd, Wynder EL. Etiological and preventive implications in alcohol carcinogenesis. Cancer Res 1979 ; 39 : 2844 – 2850.

29. Silverman S Jr, Shillitoe EH. Aetiology and predisposing factors In Silverman S Jr (ed.) Oral cancer. Atlanta : The American Cancer Society, 1990; 7 - 39.

30. Squier CA, Kremer M, Wertz PW. Ingestion of ethanol increases epithelial permeability in the rat. J Dent Res 1995; 74 : 476.

31. Enwonwu CO, Meeks VI. Bionutrition and oral cancer in humans. Crit Rev Oral Biol Med 1995 ; 6: 5 – 17.

32. Homann N. Tillonen J, Meurman JH et al. Increased salivary acetaldehyde levels in heavy drinkers and smokers : a microbiological approach to oral cavity cancer. Carcinogenesis 2000; 21: 663 – 668.

33. Homann N, Tillonen J, Rintamaki H, Salaspuro M, Lindqvist C, Meurman JH. Poor dental status increases acetaldehyde production from ethanol in saliva : a possible link to increased oral cancer risk among heavy drinkers. Oral Oncol 2001; 37: 153 – 158.

34. Moreno – Lopez LA, Esparza – Gomez GC, Gonzalez Navarro A Cerero – Lapiedra R, Gonzalez – Hernandez MJ, Dominguez – Rojas V. Risk of oral cancer associated with tobacco – smoking, alcohol consumption and oral hygiene : a case – control study in Madrid, Spain. Oral Oncol 2000 ; 36: 170 – 174.

35. Homann N, Jousimies – Somer H, Jokelainen K, Heine R, Salaspuro M. High acetaldehyde levels in saliva after ethanol consumption : methodological aspects and pathogenetic implications. Carcinogenesis 1997 ; 18: 1739 – 1743.

36. Harris C, Warnakulasuriya KAAS, Gelbier S, Johnson NN, Peters TJ. Oral and dental health in alcohol misusing patients. Alcohol Clin Exp Res 1997; 21: 1707 – 1709.

37. Boffetta P, Ye W, Adami HO, Nucci LA, Nyren O. Risk of cancers of the lung, head and neck in patients hospitalized for alcoholism in Sweden. Br J Cance 2001; 85 : 678 682.

38. Zur Hausen H. Human papillomaviruses in the pathogenesis of anogenital cancer. Virology 1991; 184 : 9 – 13.

39. Sniijders PJF, Scholes AGM, Hart GA. Prevalence of mucosatropic human papillomaviruses in squamous cell carcinomas of the head and neck. Int J Cancer 1996 ; 66 ; 464 – 469.

40. Androphy EJ. Molecular biology of human papilloma virus infection and oncogenesis. J Invest Dermatol 1994; 103 : 248 – 256.

41. Eversole LR. Letter to the editor : Papillomaviruses and oral cancer. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 197; 83 : 187 – 188.

42. **Bernard H-U, Apt D. Transcriptional control and cell type specificity of HPV gene expression. Arch Dermatol 1994 ; 130 : 210 – 215.**

**43. Woods KV, Shillitoe EJ, Spitz MR, Storthz K. Analysis of human papillomavirus DNA in oral squamous cell carcinomas. J Oral Pathol Med 1993; 22 : 101 – 108.**

**44. Mao EJ. Prevalence of human papillomavirus 16 and nucleolar organizer region counts in oral exfoliated cells from normal and malignant epithelia. Oral Surg Oral Med Oral Pathol 1995 ; 80 ; 320 – 329.**

**45. Yeudall WA. Human papillomavirus and oral neoplasia. Eur J Cancer Oral Oncol 1992; 32B : 61 – 66.**

**46. Sexton CJ, Proby CM, Banks L et al. Characterization of the factors involved in human papillomavirus type 16 – mediated immortalization of oral keratinocytes. J Gen Virol 1993 ; 74 : 755 – 761.**

**47. Kim MS, Shin KH, Back JH, Cherrick HM, Park NH. HPV – 16, tobacco – specific N-nitrosmine, and N – methyl-N-nitro-N-nitrosoguanidine in oral carcinogenesis. Cancer Res 1993; 53: 4811 – 4816.**

**48. Shin K – H Tannyhill RJ, Liu X, Park NH, Oncogenic transformationof HPV – immortalized human oral keratinocytes is associated with genetic instability of cells. Oncogene 1996 ; 12 : 1089 -1096.**

## PROFORMA

Name :

Age :

Sex :

Reg. No. :

Dt. of Admission :

Dt. of Discharge :

Risk Factors :

Symtpoms :

Site :

Type :

HPE No :

HPE Report :

Staging :

Primary Radiotherapy :

Outcome :

Surgery :

Reconstruction :

Palliative Radiotherapy :

# ABBREVIATIONS

A – Alcohol

AA – Alveolus

B – Betelnut Chewing

C – Cheek

CR - Composite resection

DRX – Dropped at various level

E – Excision

FOM – Floor of Mouth

IJV – Internal Jugular Vein

L – Lip

LFT – Liver function tests

OLK – Oral leukoplakia

PAL. RT – Palliative radiotherapy

Pmmc – Pect oralis Major myocutaneous flap

RND – Radical Neck Dissection

RT – Primary Radiotherapy W.E. – Wide Excision

S – Smoking

SCC – Squamous cell carcinoma

SCM – Sternocleidomastoid

T (Risk factor) – Tobaccochewing

T (site) – Tongue